DESCRIPTION

Pressing plunger mechanism for a glassware forming machine

The invention relates to a pressing plunger mechanism in accordance with the preamble of claim 1.

In the case of a known pressing plunger mechanism of this type (DE 30 40 762 C2 of the applicant) the pressing plunger holders are driven by a crank gear (column 6, lines 22 and 23). This construction is expensive and takes up a large amount of space in the glassware forming machine.

An alternative type of drive for the pressing plunger holders is known from US 5,411,564. These are accordingly each moved axially in a reciprocating manner by a piston-cylinder unit between a pressing and an inoperative position. This pressure medium drive is supported by a first housing which is disposed so that it can be adjusted with respect to a machine frame in parallel with the longitudinal direction of the pressing plungers by means of a further drive formed as a spindle drive. This latter-named spindle drive is formed by a plurality of threaded spindles extending in parallel with each other, which are engaged with spindle nuts disposed in a non-rotatable manner in a base of the said housing, which are united on the input side by a gear mechanism and which are connected to a drive. However, precise movement control with a pressure medium drive is barely possible or is only possible at great expense.

It is the object of the invention to simplify and to render more precise the linear drive of the pressing plungers while taking up a small amount of space.

This object is achieved by the features of claim 1. Compressed air in particular is considered as the compressed fluid acting upon the pistons. In this way the pressing plunger can be constantly pretensioned in the direction of its pressing position. An elastic pad is thus provided for the

pressing position of the pressing plunger and effects a pressing force limitation. By means of the threaded spindle any desired axial position of the pressing plunger can be approached very precisely and rapidly. These positions are, for example, the inoperative position, the pressing position and a loading position therebetween, which are all known per se. The construction height of the pressing plunger mechanism can be desirably reduced by the angular gear.

The said second drive serves for basic axial adjustment of the pressing plungers for adaptation to the glass vessels to be produced on the glassware forming machine.

The features of claim 2 serve for controlled movement of the pressing plunger.

In accordance with claim 3 a reliable rotary drive for the nut is obtained with a low construction height.

The features of claim 4 serve to simplify the structure and construction.

In accordance with claim 5 undesired opening of the coupling rings can be prevented in a simple manner.

By the features of claim 6 the axial position of the pressing plunger can be determined extremely precisely and by simple means. The maximum penetration depth of the pressing plunger into the glass gob in the pre-mould is of particular interest. The size of the mass of the glass gob can be determined therefrom. The positional signals can be used to regulate the gob mass.

By the features of claim 7 the piston rod can be secured against rotation.

The features of claim 8 serve to simplify the construction.

The formation of the second drive in accordance with claim 9 also serves this purpose.

The same is true of the features of claim 10.

In accordance with claim 11 the basic axial adjustment of the pressing plungers achieved by the second drive can be fixed in a simple and effective manner.

The features of claim 12 are particularly advantageous in structural terms.

By means of the features of claim 13 extremely stable and precise longitudinal guidance is provided both for the traverse and also for the first housing.

In accordance with claim 14 a supply of cooling air to the pressing plungers and a supply of compressed fluid to the pistons and cylinders of the pressing plunger holders is ensured in an extremely operationally reliable and constructionally simple manner. These flowable media can be supplied in any manner to the supply pipes through the machine bed. The further conveyance of these media from the end of the telescopic pipes takes place respectively in a suitable manner via a duct system.

In accordance with claim 15 the supply and telescopic pipes are protected in a particular manner against mechanical damage and against tipping with respect to each other.

These and further features and advantages of the invention are explained in more detail hereinunder with the aid of the exemplified embodiment illustrated in the drawings in which:

Fig. 1 shows an longitudinal cross-sectional view through a pressing plunger mechanism at line I-I in Fig. 2,

Fig. 2 shows the cross-sectional view at line II-II in Fig. 1,

Fig. 3 shows the cross-sectional view at line III-III in Fig. 2 on an enlarged scale,

Fig. 4 shows the upper region of Fig. 1 on an enlarged scale,

Fig. 5 shows essentially the view at line V-V in Fig. 4,

Fig. 6 shows the cross-sectional view at line VI-VI in Fig. 5 and

Fig. 7 shows the cross-sectional view at line VII-VII in Fig. 2 on an enlarged scale.

shown in Fig. 1. The piston, e.g. 58, is then displaced with its piston rod 60 against the pressure of the compressed fluid relative to the cylinder 56. In this way an effective pressing force limitation is achieved. If, on the other hand, a glass gob of excessively small mass enters the pre-mould, the pressing plunger 72 moves into its uppermost end operating position shown in Fig. 1.

If the pressing plunger 72 has to be changed, the pressing plunger holder 45, 46 can be moved upwards by the first drive 9 beyond the uppermost end operating position shown in Fig. 1 until the split ring 73 protrudes upwards out of its support cylinder 47, 48. In this axial mounting position the split ring 73 can be opened and the pressing plunger 72 can be changed. The split ring 73 is then closed and moved down into its support cylinder 47, 48.

These two states of excessively large or small glass masses of the glass gob are determined by displacement pick-ups 75 in accordance with Fig. 2. The displacement pick-ups 75 are fastened to the first housing 8 in parallel with the associated piston rod 60, 61. An actuating element 76 for the displacement pick-up 75 is screwed to the respective collar 64, 65. In this way by means of the displacement pick-up 75 electrical signals corresponding to the axial position of the associated pressing plunger 72 can be input into an evaluation circuit 77. Thus in a manner which is known per se the mass of the glass gobs can be regulated by the evaluation circuit 77.

Fig. 2 also shows that the flange 53 of the clamping device 52 is fastened on the one hand in each case by means of a screw 78 to the upper end of the guide rods 27, 28 and on the other hand with screws 79 to the head plate 54.

In accordance with Fig. 3 supply pipes 80 and 81 formed as one piece with each other are fastened in parallel with the longitudinal axis 69 (Fig. 1) to the base 32 of the second housing 31. The supply pipe 80 is supplied with cooling air for the pressing plunger 72 through the connection block 44 in the direction of an arrow 82.